

Health Insurance Coverage Among People With and Without Diabetes in the U.S. Adult Population

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OBJECTIVE—To compare health insurance coverage and type of coverage for adults with and without diabetes.

RESEARCH DESIGN AND METHODS—The data used were from 2,704 adults who self-reported diabetes and 25,008 adults without reported diabetes in the 2009 National Health Interview Survey. Participants reported on their current type of health insurance coverage, demographic information, diabetes-related factors, and comorbidities. If uninsured, participants reported reasons for not having health insurance.

RESULTS—Among all adults with diabetes, 90% had some form of health insurance coverage, including 85% of people 18–64 years of age and ~100% of people ≥65 years of age; 81% of people without diabetes had some type of coverage (vs. diabetes, $P < 0.0001$), including 78% of people 18–64 years of age and 99% of people ≥65 years of age. More adults 18–64 years of age with diabetes had Medicare coverage (14% vs. no diabetes, 3%; $P < 0.0001$); fewer people with diabetes had private insurance (58% vs. no diabetes, 66%; $P < 0.0001$). People 18–64 years of age with diabetes more often had two health insurance sources compared with people without diabetes (13 vs. 5%, $P < 0.0001$). The most common private plan was a preferred provider organization (PPO) followed by a health maintenance organization/independent practice organization (HMO/IPA) plan regardless of diabetes status. For participants 18–64 years of age, high health insurance cost was the most common reason for not having coverage.

CONCLUSIONS—Two million adults <65 years of age with diabetes had no health insurance coverage, which has considerable public health and economic impact. Health care reform should work toward ensuring that people with diabetes have coverage for routine care.

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The number of adults in the U.S. without health insurance is substantial; in 2010, 23% of people 18–64 years of age (43 million) reported being uninsured, and 17% (32 million) reported having been uninsured for >1 year (1). Lack of health insurance coverage is often a barrier for receiving routine, preventive medical care, yet these services are essential for people with diabetes who need regular check-ups to monitor metabolic control, diabetes complications, and disease progression. National data from the 2000 Behavioral Risk Factor and

Surveillance System have shown that uninsured adults with diabetes are less likely to report annual dilated eye exams, foot examinations, and hemoglobin A_{1c} (A1C) tests, and less likely to perform daily blood glucose monitoring, than those with private health insurance (2). In the 2009 National Health Interview Survey (NHIS), uninsured people with diabetes were six times more likely to forgo needed health care because of cost compared with those who were continuously insured (3). In the 1999–2004 National Health and Nutrition Examination Survey,

uninsured adults with diabetes more often reported not having a standard site for care when sick and not visiting a health professional in the past 12 months compared with those who were insured (4). Thus, health insurance coverage is an important policy issue both for people with diabetes and for public health planning officials. Lack of coverage can have large economic costs due to delays in diagnosis and treatment, especially among a population that requires frequent routine medical care. However, few studies have examined health insurance coverage and type of coverage among people with diabetes and whether coverage is different for people without diabetes. A comprehensive look at health insurance coverage in the U.S. diabetic population has not been presented for many years (5). To investigate these issues and to update estimates from 1989, we analyzed data from the 2009 NHIS, which included extensive information on health insurance.

RESEARCH DESIGN AND METHODS

The NHIS is a cross-sectional household interview survey that has been conducted annually since 1957 across the U.S. The survey is implemented by the National Center for Health Statistics (NCHS) and uses a multistage area probability design among the noninstitutionalized U.S. population. Details of the survey methods have been described elsewhere (6).

Study population, demographic, and diabetes data

The sample included 27,712 adults (≥18 years of age) who completed the 2009 adult sample questionnaire and indicated whether they had diabetes based on the question “(If female, other than during pregnancy) Have you ever been told by a doctor or health professional that you have diabetes or sugar diabetes?” Participants were excluded if they did not know their diabetes status ($n = 9$) or refused to answer the question ($n = 10$); 2,704 participants reported a diagnosis of diabetes. Demographic characteristics and diabetes-related factors were self-reported. Nondiabetic

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individuals included four participants who reported prediabetes and current insulin use and 78 participants who reported oral medication use. Family income was categorized broadly by the NCHS as \leq \$35,000, \$35,000–49,000, \$50,000–74,000, \$75,000–99,999, and \geq \$100,000. Income was unknown in 5.8% of participants. We included 347 sample adults who had a proxy respondent; the percentage with health insurance coverage was similar with inclusion/exclusion of these individuals.

Health insurance coverage

Participants were queried on their type(s) of health insurance coverage, which included Medicare, Medicaid, military benefits, private insurance, other public (e.g., state-sponsored health plan), other government, and state children’s health insurance program (SCHIP). Since the number of participants with other public ($n = 304$), other government ($n = 116$), and SCHIP ($n = 56$) coverage was low, participants with these types of coverage were grouped with participants who reported Medicaid coverage, a common government-funded medical insurance plan for low-income people and those with long-term disabilities. Private health insurance categories included health

maintenance organization/independent practice organization (HMO/IPA), preferred provider organization (PPO), point-of-service, and fee-for-service plans. Individuals could have more than one type of health insurance. Participants with single disease coverage only (e.g., dental) or Indian Health Service coverage were considered uninsured, consistent with the methods used by others (3). Reasons for no health insurance coverage were reported by participants who were uninsured. Participants with private insurance self-reported the amount spent on out-of-pocket private insurance premiums in the past year, with values capped at \$20,000; 38% of participants with private insurance were unaware of costs. The amount spent on family medical costs in the past year, excluding premium costs, was self-reported as one of six categories: \$0, <\$500, \$500–1,999, \$2,000–2,999, \$3,000–4,999, and \geq \$5,000.

Statistical analysis

Descriptive statistics (means, %, and SE) were used to show health insurance coverage, types of coverage, number of health insurance sources by diabetes status, participant characteristics by health insurance and diabetes status, and reasons for no health insurance coverage in uninsured

people 18–64 years of age by diabetes status. Differences in means and proportions were tested for statistical significance by two-tailed, large-sample z tests, with no adjustment for multiple comparisons. To determine the proportion of income spent on private premiums, mean and median costs were divided by the midpoint of the family income category. For a large proportion of people with private insurance, the percentage of income spent on premiums could not be determined due to missing values ($n = 6,776$, 41%, predominantly for missing premiums [see above]). To determine the proportion of income spent on family medical costs, the midpoints of cost categories were divided by the midpoints of family income categories; 8% of the study population had missing values for income or medical costs ($n = 1,699$). All statistical analyses used sample weights and accounted for the cluster design using SUDAAN (SUDAAN User’s Manual; release 9.2, 2008; Research Triangle Institute).

RESULTS

Health insurance coverage

Among adults with diabetes, 90.1% had some form of health insurance coverage compared with 81.4% of adults without

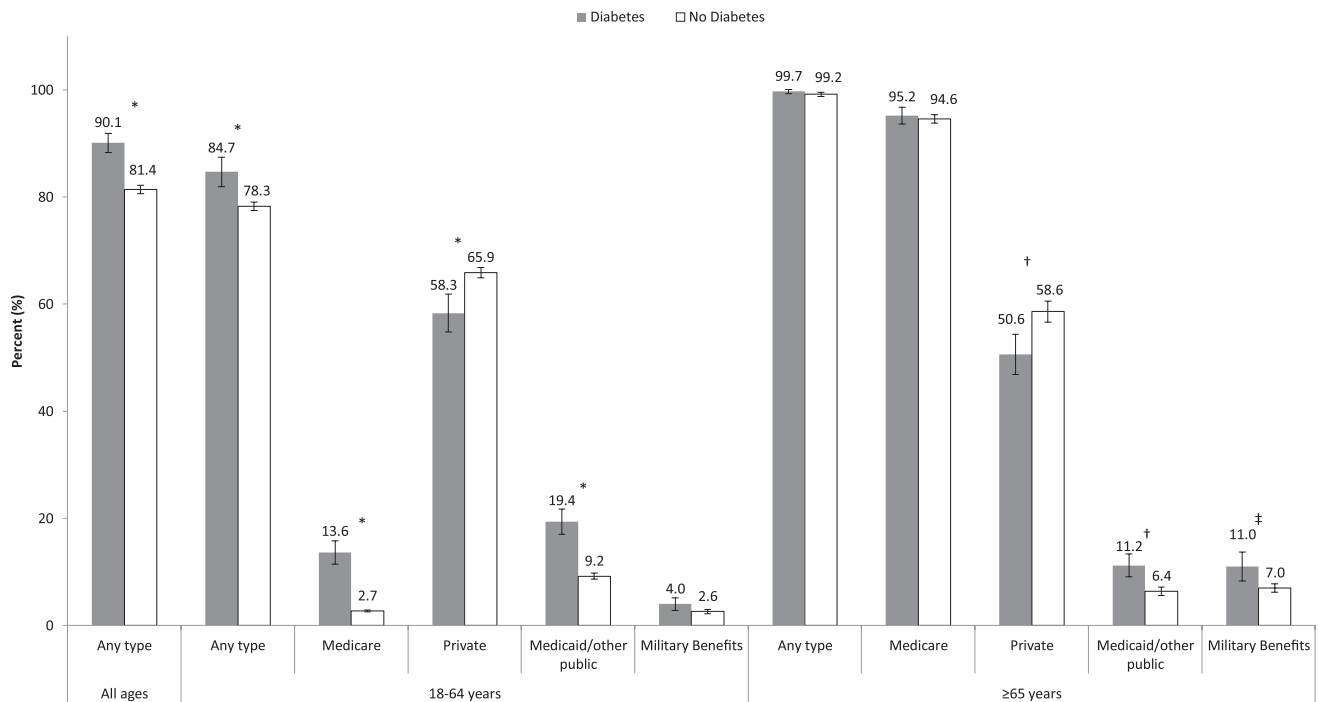


Figure 1—Percentage of types of health insurance coverage by age and diabetes status among adults \geq 18 years of age, NHIS 2009. Types of health insurance are not mutually exclusive. Significance testing compares people with diabetes to people without diabetes for each type of health insurance coverage. * $P < 0.0001$; † $P = 0.0001$; ‡ $P = 0.005$.

diabetes ($P < 0.0001$) (Fig. 1). For people 18–64 years of age, 84.7% of people with diabetes had health insurance compared with 78.3% of people without diabetes ($P < 0.0001$). Coverage for diabetic people 18–64 years of age was higher for those taking both insulin and oral medications (90.7%) compared with those not taking any diabetes medication (80.5%, $P = 0.007$) (Table 1). Nearly 100% of people ≥ 65 years of age had health insurance coverage regardless of diabetes status. Data from the 2009 NHIS indicate that 20.5 million adults had diabetes; applying the above rates of health insurance coverage, 2.02 million adults with diabetes had no health insurance coverage, including 2.0 million adults 18–64 years of age and 25,700 ≥ 65 years of age. For adults without diabetes, 38.4 million had no health insurance, including 38.1 million 18–64 years of age and 251,550 ≥ 65 years of age.

Type of health insurance coverage

For people 18–64 years of age, 13.6% of people with diabetes had Medicare coverage compared with 2.7% of those without diabetes ($P < 0.0001$) (Fig. 1). Fewer people with diabetes had private insurance coverage than those without diabetes ($P < 0.0001$). More people with diabetes were insured by Medicaid/other public coverage compared with people without diabetes ($P < 0.0001$). The proportion of diabetic individuals with Medicare coverage was not significantly different for those using both insulin and oral medications (24.9%) versus those using insulin alone (17.4%, $P = 0.290$), but was significantly greater than that for people only taking oral medications (10.3%, $P = 0.0008$) and for those on no medications (12.4%, $P = 0.027$). Only a small percentage of diabetic (4.0%) and nondiabetic (2.6%) individuals had coverage through military benefits.

Among people ≥ 65 years of age, 95% of people had Medicare regardless of diabetes status (Fig. 1). Fewer people with diabetes had private insurance (50.6%) compared with people without diabetes (58.6%, $P = 0.0001$). Medicaid and military benefits were higher for people with diabetes compared with people without diabetes ($P = 0.0001$ and $P = 0.005$, respectively).

Number of health insurance sources

For adults 18–64 years of age, the majority of both diabetic (71.6%) and nondiabetic (73.1%) individuals had one source

Table 1—Health insurance coverage (%) of adults 18–64 years of age with and without diabetes by demographic and diabetes-related factors, NHIS 2009

	Health insurance coverage			
	Diabetes		No diabetes	
	<i>n</i>	% (SE)	<i>n</i>	% (SE)
Total	1,335	84.7 (1.4)	15,767	78.3 (0.4)
Sex				
Male	605	84.8 (1.8)	6,817	75.1 (0.6)
Female	730	84.7 (1.7)	8,950	81.4 (0.5)
Age (years)				
18–29	43	74.7 (7.4)	3,569	69.5 (0.9)
30–39	135	80.0 (4.3)	3,572	77.0 (0.7)
40–49	297	84.4 (2.7)	3,646	79.6 (0.7)
50–64	860	86.3 (1.5)	4,980	87.1 (0.6)
Race				
Non-Hispanic white	718	87.6 (1.8)	9,726	83.9 (0.5)
Non-Hispanic black	308	85.4 (2.3)	2,482	74.5 (1.1)
Hispanic	253	72.0 (3.6)	2,396	56.1 (1.2)
Non-Hispanic Asian	46	91.3 (4.3)	1,052	82.6 (1.4)
Education				
Less than high school	255	71.4 (3.8)	1,643	56.0 (1.4)
High school graduate	414	86.2 (2.0)	3,712	71.6 (0.9)
Associate degree/some college	420	86.4 (1.9)	5,099	80.9 (0.6)
Bachelor's degree	156	94.0 (2.0)	3,464	90.5 (0.6)
Master's or professional degree	88	97.6 (1.5)	1,799	94.5 (0.8)
Family income				
<\$35,000	578	75.7 (2.3)	4,582	60.4 (0.8)
\$35,000–49,000	173	76.7 (4.4)	2,083	72.2 (1.1)
\$50,000–74,000	232	90.6 (2.2)	2,925	82.0 (0.9)
\$75,000–99,000	120	95.0 (2.1)	1,982	90.6 (0.9)
\geq \$100,000	168	96.0 (1.5)	3,382	94.3 (0.6)
Marital status				
Married or living with a partner	689	86.2 (1.8)	8,627	82.0 (0.5)
Divorced or separated	321	82.7 (3.1)	2,509	74.0 (1.0)
Widowed	86	85.0 (5.3)	366	79.6 (2.6)
Never married	238	80.2 (3.5)	4,231	71.2 (0.9)
Diabetes-related factors				
Diabetes duration (years)				
<1	71	83.1 (6.0)	—	—
1 to <5	414	80.2 (2.6)	—	—
5 to <10	317	87.7 (1.9)	—	—
10 to <20	323	86.3 (2.5)	—	—
\geq 20	195	88.6 (3.1)	—	—
Diabetes medication				
Insulin only	174	85.7 (3.4)	4	100.0 (0)
Oral only	753	84.4 (1.7)	78	90.3 (3.0)
Insulin and oral	205	90.7 (2.5)	0	—
None	203	80.5 (2.9)	15,685	78.2 (0.4)
Hypertension				
Yes	891	86.8 (1.5)	3,439	84.1 (0.7)
No	443	81.2 (2.2)	12,319	76.9 (0.5)
Heart condition/disease*				
Yes	306	90.5 (1.9)	1,195	83.8 (1.2)
No	1,027	83.1 (1.6)	14,562	77.9 (0.4)
Weak or failing kidneys				
Yes	99	86.5 (4.7)	163	75.3 (4.6)
No	1,236	84.6 (1.4)	15,598	78.3 (0.4)

Continued on p. 2246

Table 1—Continued

	Health insurance coverage			
	Diabetes		No diabetes	
	n	% (SE)	n	% (SE)
Seen doctor in past 12 months				
Yes	1,154	87.6 (1.3)	10,778	87.2 (0.4)
No	173	68.8 (4.0)	4,857	63.8 (0.8)
Seen eye doctor in past 12 months				
Yes	756	93.0 (1.0)	5,771	89.2 (0.5)
No	570	75.3 (2.4)	9,868	73.0 (0.5)
Seen foot doctor in past 12 months				
Yes	253	94.0 (2.9)	810	93.2 (0.9)
No	1,074	82.8 (1.4)	14,831	77.6 (0.4)
Vision problems				
Yes	227	81.7 (3.4)	1,060	74.8 (1.8)
No	1,108	85.4 (1.4)	14,701	78.6 (0.4)

*Heart condition includes coronary heart disease, angina pectoris, heart attack, or other heart problem.

of health insurance; nevertheless, 15.3% of people with diabetes and 21.7% of those without diabetes had no insurance ($P < 0.0001$) (data not shown). More people with diabetes (12.9%) than without (4.9%) had two health insurance sources ($P < 0.0001$). Only 0.2% of diabetic and 0.3% of nondiabetic adults 18–64 years of age had three or more sources. For people ≥ 65 years of age, the number of sources of health insurance was similar for diabetic and nondiabetic adults, with about one-third (34.5% diabetic and 33.7% nondiabetic) having one source, the majority (60.2% diabetic and 61.8% nondiabetic) having two sources, and $\leq 5\%$ having three or more sources.

Type of private health insurance

Among all adults with private coverage, most had PPO plans, followed by HMO/IPA plans (Fig. 2). Among people 18–64 years of age, significantly fewer diabetic (58.3%) than nondiabetic (64.6%) individuals had a PPO ($P = 0.011$); significantly more diabetic (33.7%) than nondiabetic (28.9%) individuals had an HMO/IPA plan ($P = 0.049$). Among people ≥ 65 years of age, types of private health insurance coverage were similar by diabetes status; other private insurance included Medigap or Medicare Advantage plans.

Additional health insurance coverage

Among diabetic adults 18–64 years of age who reported having private insurance, the vast majority (90.7%) had only private coverage; 6.3% had additional Medicare coverage, 2.0% had additional military benefits, 0.9% had additional Medicaid/other

public coverage, and 0.2% had a combination of three plans (data not shown). For those with private insurance, 91.1% had prescription coverage and 47.3% had dental coverage through the private plan; 45.9% had both. Dental and prescription coverage through a private plan did not differ by diabetes status ($P > 0.05$).

For diabetic adults ≥ 65 years of age with Medicare, 31.8% had only Medicare coverage and 47.5% had additional private health insurance; more people without diabetes had an additional private plan (56.0%, $P < 0.0001$) and fewer had additional Medicaid coverage (5.5%, $P = 0.0008$). For diabetic people, the majority (52.6%) had both Part A (hospital insurance) and Part B (medical insurance) Medicare insurance; an additional 41.9% had Parts A, B, and D (prescription plan). The percentages having Medicare Parts A, B, and D did not differ by diabetes status.

Reasons for not having health insurance

For people 18–64 years of age, high health insurance cost was the predominant reason for not having coverage, regardless of diabetes status (51.5% of diabetic and 46.5% of nondiabetic individuals, $P = 0.275$). Thirty-five percent of people with diabetes and 29.9% of those without diabetes reported job loss or a change in employer as a reason for no coverage ($P = 0.220$). Fewer people with diabetes reported that their employer does not offer or they are not eligible for health insurance (8.2%) compared with those without diabetes (13.8%, $P = 0.005$).

Demographic and diabetes-related characteristics by health insurance coverage

In both diabetic and nondiabetic adults 18–64 years of age, non-Hispanic whites (vs. Hispanics) and people with more education (higher education vs. less than high school) and income (family income $\geq \$100,000$ vs. $< \$35,000$) were more likely to have health insurance coverage ($P \leq 0.0002$ for all) (Table 1). Among people with diabetes, the percentage of individuals with health insurance coverage was similar across categories of duration of diabetes and glycemic medication use. People with diabetes who had hypertension or a heart condition more often had health insurance coverage than their counterparts without these conditions ($P < 0.05$ for both). For people who reported a heart condition, the percentage with health insurance coverage was higher in those with diabetes compared with those without ($P = 0.004$). Regardless of diabetes status, the percentage with health insurance was higher in people seeing a regular doctor or specialist in the past year ($P \leq 0.0001$ for all).

Health insurance costs

The proportion of family income spent on out-of-pocket private insurance premiums and family medical costs was higher for people with low income, regardless of diabetes status. Using median premium costs, people 18–64 years of age with diabetes who had an income of $\leq \$34,000$ spent 12.2% of their family income on private premiums whereas counterparts with an income of $\geq \$100,000$ spent 3.0% of their family income on private premiums (data not shown). Similar trends were seen for diabetic people ≥ 65 years of age and for people in both age-groups without diabetes. When using mean health insurance premium costs, a less conservative approach, a greater discrepancy between low and high income earners was shown for people with diabetes 18–64 years of age (22% for income $\leq \$34,000$ vs. 4% for income $\geq \$100,000$). For medical costs, people with diabetes 18–64 years of age who had family income $\leq \$35,000$ spent 6.0% of their income on medical care compared with their counterparts with family income $\geq \$100,000$ who spent 1.9% of their income on medical care costs.

CONCLUSIONS—Health insurance coverage among people with diabetes compared with coverage for people without diabetes has not been examined in national

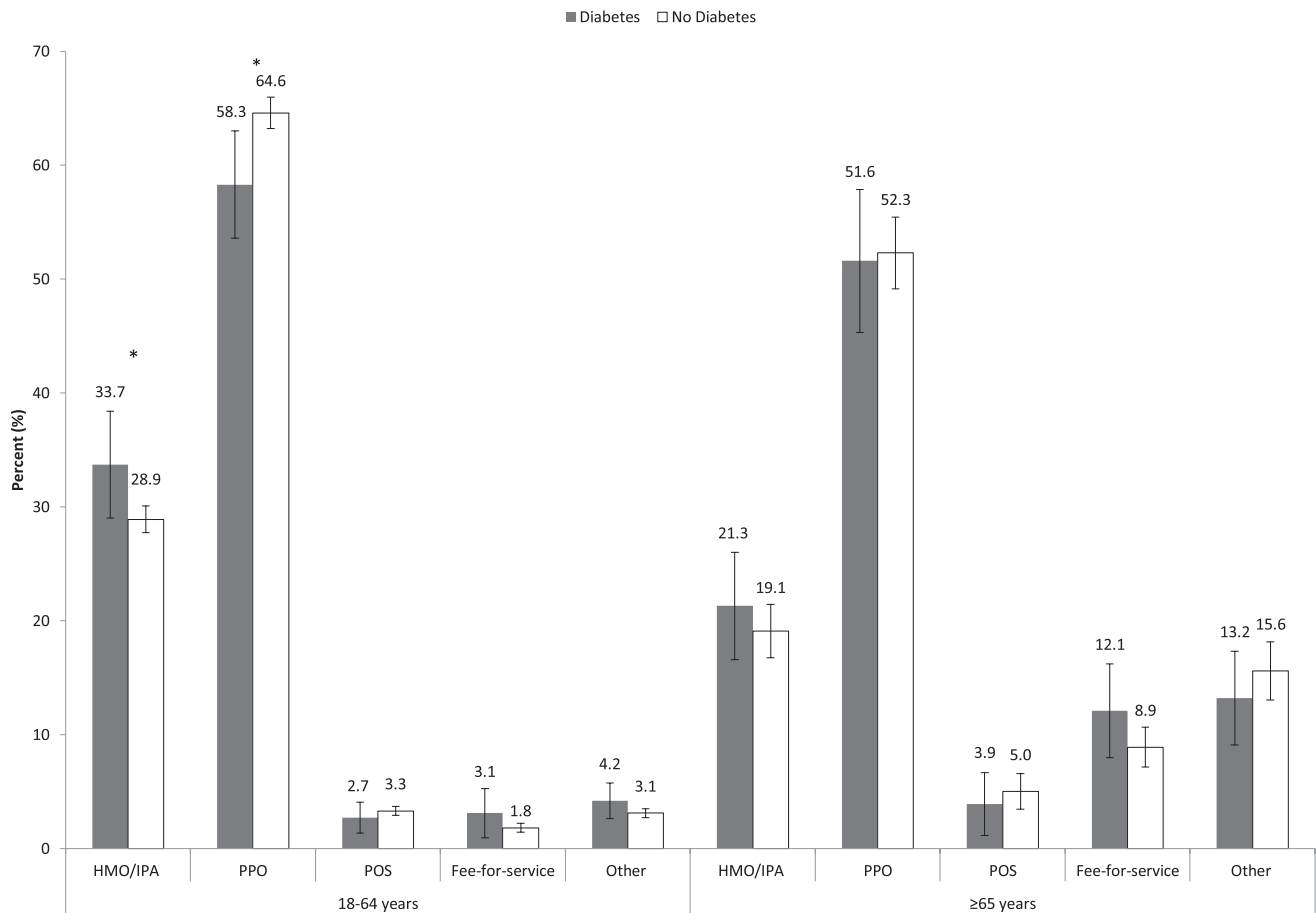


Figure 2—Percentage of types of private health insurance by age and diabetes status among adults ≥ 18 years of age, NHIS 2009. Types of private health insurance are not mutually exclusive. Significance testing compares people with diabetes to people without diabetes for each type of private health insurance. POS, point of service. * $P < 0.05$.

data for a couple of decades. We found that nearly all diabetic and nondiabetic adults ≥ 65 years of age had health insurance, mainly attributable to having Medicare benefits. Although the majority of adults 18–64 years of age had health insurance coverage, a significant proportion was uninsured (15% of those with diabetes and 22% of those without). This represented ~ 2 million adults 18–64 years of age with diabetes who were not insured, $\sim 5\%$ of the total uninsured population in the U.S. (1). This is a large public health concern given that the diabetic population needs routine care to prevent serious diabetes-related complications.

The financial burden of diabetes both to society and to the individuals with diabetes is substantial. Significantly more adults 18–64 years of age with diabetes had Medicare, Medicaid, or other public insurance compared with their counterparts without diabetes, putting a strain on government-funded insurance mechanisms (7). Although almost all diabetic

adults ≥ 65 years of age had Medicare, most supplemented Medicare with private insurance, which may be a financial burden, especially for those with limited income. Thus, although the majority of people with diabetes have health insurance coverage, a large proportion apparently lacks adequate coverage, requiring supplemental insurance to obtain additional preventive and maintenance health services.

Several changes in health insurance coverage have occurred over the past two decades. Although the proportion of diabetic individuals with health insurance coverage was similar in 1989 (92%) (5) and 2009 (90%, herein), the absolute number of people with diabetes who were uninsured rose over threefold, from 600,000 to 2.02 million. With no improvement in the rate of health insurance coverage among diabetic individuals and the rise in the prevalence of diabetes, the burden of diabetes in terms of costs to society has significantly increased over this 20-year period. Second, although the proportion of

people with health insurance coverage remained higher over time for people with diabetes, the gap in the proportion covered between people with and without diabetes increased from 5% in 1989 to 9% in 2009; people with diabetes had greater coverage relative to people without diabetes in 2009. People without diabetes may forego insurance because of rising costs, particularly if they are healthy and believe insurance is unnecessary. In addition, adults < 65 years of age with diabetes are entitled to Medicare coverage if they have a long-term disability, including end-stage renal disease, which may offset the effect of increasing insurance costs for people with diabetes. Third, the proportion of diabetic adults < 65 years of age with Medicare coverage increased from 10 to 14% between 1989 and 2009. In addition, the proportion with private insurance decreased for diabetic individuals of all ages (18–64 years of age, from 69 to 58% between 1989 and 2009; ≥ 65 years of age, from 69 to 51% between 1989 and 2009). The decrease in private health

insurance may be related to rising health insurance costs, greater unemployment over the past decade, and more people living under the poverty threshold. Finally, the most common types of private health insurance plans shifted from fee-for-service plans to PPO plans. In the 1980s and 1990s, health insurance costs increased considerably, and the majority of employer-sponsored fee-for-service plans were replaced with less expensive managed care plans.

Our results corroborate previous studies indicating that lack of health insurance coverage is a major barrier to health care access that could, consequently, have detrimental health effects in people with diabetes (2–4). Regardless of diabetes status, seeing a doctor for general care, an eye doctor, or a foot doctor in the past year was more common for those with health insurance. People with hypertension or a heart condition were also more likely to have health insurance; coverage may encourage people to schedule regular medical visits, which provides more opportunities for diagnosis. A study among underserved diabetic patients receiving care at Federally Qualified Health Centers, where care is provided regardless of insurance status, indicated that those with continuous health insurance were more likely to receive LDL testing, a flu vaccine, and/or nephropathy screening (8). In addition, patients who had partial insurance coverage in the past 3 years, regardless of the amount of time insured, were less likely to receive preventive care (9). We also found that health insurance coverage was lower in minorities and people with less education and income. Efforts should focus on increasing health insurance coverage for underserved populations who are often at the highest risk for diabetes complications (10,11).

Two primary reasons were stated for U.S. adults <65 years of age not having health insurance coverage. First, high cost was the most common reason for no insurance, a finding supported in previous literature (3). We found that few adults with private insurance had low income, regardless of diabetes status. Among people with private insurance, only 4% of adults had family incomes below the poverty threshold, whereas the majority (68% with diabetes and 71% without diabetes) had incomes well above the poverty threshold (poverty income ratio ≥ 3.0 , a yearly income of $\geq \$66,000$ for a family of four). Furthermore, the proportion of income spent on private insurance premiums and family medical care was higher

for low-income people, a result supported in previous work (12). Second, unemployment has significantly increased over the past decade, leaving many without the means to pay for insurance (13). Indeed, we found that job loss or change in employers was the second most common reason reported for not having insurance.

Medical expenses for people with diabetes are estimated to be 2.5 times higher than those for people without diabetes (10). The direct costs of diabetes were estimated to be \$116 billion in 2007 (14). The 2010 health care reform bill would help cover the majority of the 2 million U.S. adults with diabetes who are uninsured (15). However, it remains to be seen whether these policies would adequately cover diabetic individuals' medical needs and whether insurance premiums would be affordable for all patients. As part of health care reform, the Pre-existing Condition Insurance Plan would cover people with diabetes who have been uninsured for the past 6 months, with costs varying depending on state of residence, age, and plan type.

A major strength of our study is the use of national data, which allows generalization to the U.S. adult noninstitutionalized population. A limitation is that we could not distinguish between type 1 and type 2 diabetes. Nevertheless, we assessed insurance coverage by glycemic medication use and found some differences in coverage for people who were on insulin compared with those who were taking oral or no medications. We could not distinguish people with undiagnosed diabetes. Previous work has shown that people with undiagnosed diabetes have a higher uninsured rate than people with diagnosed diabetes; thus, the percentage with health insurance coverage may be underestimated in this study (16). Our analysis included participants who reported prediabetes and use of insulin ($n = 4$) or oral medication use ($n = 78$). It is likely that the participants taking oral medications are using them to lose weight and/or prevent diabetes. Although it is less clear whether the data are valid for the prediabetic individuals reporting insulin use, the inclusion of these participants would not impact the estimates. Finally, we were only able to determine the proportion of people with prescription coverage among those with Medicare or private insurance; the proportion of people with dental coverage could only be determined for those with private insurance. In addition, we could not examine the extent of dental and prescription coverage.

In the past 20 years, major scientific advancements have established that achieving and maintaining glucose control as early as possible significantly reduces the onset and progression of diabetes complications (17,18); furthermore, long-term follow-up has shown that glucose control in adults who are at high risk for diabetes is cost-effective (19). In addition, there is evidence that age of diabetes diagnosis, some complications, and mortality have been decreasing over time (20–22). Therefore, with universal coverage of people with diabetes, such as through reformed health care that translates to greater provision of medical care, there is the very real opportunity to reduce the overall burden of diabetes to society.

This study provides baseline information on health insurance coverage and, in the future, could be used to evaluate whether health care reform increases the percentage of people with diabetes who have coverage. Health insurance coverage, combined with diabetes education and public health prevention strategies, is fundamental for reducing diabetes complications, increasing the quality of life for people with diabetes, and reducing the economic burden of diabetes-related medical costs.

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S.S.C. contributed to the research design, analyzed the data, and wrote, reviewed, and edited the manuscript. C.C.C. contributed to the research design and the discussion and reviewed and edited the manuscript. S.S.C. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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References

1. Martinez ME, Cohen RA. Health insurance coverage. In *Early Release of Estimates from the National Health Interview Survey, January–September 2010*. Atlanta, GA, National Center for Health Statistics, Centers for Disease Control and Prevention, March 2011.
2. Nelson KM, Chapko MK, Reiber G, Boyko EJ. The association between health insurance coverage and diabetes care; data

- from the 2000 Behavioral Risk Factor Surveillance System. *Health Serv Res* 2005;40:361–372
3. Fox JB, Richards CL; Centers for Disease Control and Prevention (CDC). Vital signs: health insurance coverage and health care utilization — United States, 2006–2009 and January–March 2010. *MMWR Morb Mortal Wkly Rep* 2010;59:1448–1454
 4. Wilper AP, Woolhandler S, Lasser KE, McCormick D, Bor DH, Himmelstein DU. A national study of chronic disease prevalence and access to care in uninsured U.S. adults. *Ann Intern Med* 2008;149:170–176
 5. Harris MI, Cowie CC, Eastman R. Health-insurance coverage for adults with diabetes in the U.S. population. *Diabetes Care* 1994;17:585–591
 6. Centers for Disease Control and Prevention. *NHIS Survey Description*. Hyattsville, Maryland, U.S. Department of Health and Human Services, 2010
 7. Baicker K, Chernew ME. The economics of financing Medicare. *N Engl J Med* 2011;365:e7
 8. Gold R, DeVoe J, Shah A, Chauvie S. Insurance continuity and receipt of diabetes preventive care in a network of federally qualified health centers. *Med Care* 2009;47:431–439
 9. Gold R, DeVoe JE, McIntire PJ, Puro JE, Chauvie SL, Shah AR. Receipt of diabetes preventive care among safety net patients associated with differing levels of insurance coverage. *J Am Board Fam Med* 2012;25:42–49
 10. Centers for Disease Control and Prevention. *National Diabetes Fact Sheet: National Estimates and General Information on Diabetes and Prediabetes in the United States, 2011*. Atlanta, GA, U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2011
 11. People H. 2020. *Diabetes Overview and Objectives*. Washington, D.C., U.S. Department of Health and Human Services, 2011
 12. Ketsche P, Adams EK, Wallace S, Kannan VD, Kannan H. Lower-income families pay a higher share of income toward national health care spending than higher-income families do. *Health Aff (Millwood)* 2011;30:1637–1646
 13. Bureau of Labor Statistics. *Databases, Tables, and Calculators by Subject*. Washington, DC, United States Department of Labor, 2011
 14. National Center for Chronic Disease Prevention and Health Promotion, Division of Diabetes Translation. *Diabetes at a Glance-2011*. Atlanta, GA, U.S. Department of Health and Human Services, 2011
 15. Affordable Care Act. Pre-existing Condition Insurance Plan. Washington, DC, Department of Health and Human Services, 2010
 16. Zhang X, Geiss LS, Cheng YJ, Beckles GL, Gregg EW, Kahn HS. The missed patient with diabetes: how access to health care affects the detection of diabetes. *Diabetes Care* 2008;31:1748–1753
 17. The Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med* 1993;329:977–986
 18. UK Prospective Diabetes Study (UKPDS) Group. Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). *Lancet* 1998;352:837–853
 19. Diabetes Prevention Program Research Group. The 10-year cost-effectiveness of lifestyle intervention or metformin for diabetes prevention: an intent-to-treat analysis of the DPP/DPPOS. *Diabetes Care* 2012;35:723–730
 20. Gregg EW, Gu Q, Cheng YJ, Narayan KM, Cowie CC. Mortality trends in men and women with diabetes, 1971 to 2000. *Ann Intern Med* 2007;147:149–155
 21. People H. Focus area 5: diabetes. In *Healthy People 2010 Final Review*. Centers for Disease Control and Prevention and National Institutes of Health, 2012
 22. Saydah SH, Fradkin J, Cowie CC. Poor control of risk factors for vascular disease among adults with previously diagnosed diabetes. *JAMA* 2004;291:335–342